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REMARKS

In view of the following discussion, the Applicants submit that none of the claims now pending in the application is anticipated under the provisions of 35 U.S.C. §102 or unpatentable under the provisions of 35 U.S.C. §103. Thus, the Applicants believe that all of these claims are now in allowable form.

I. REJECTION OF CLAIMS 1 AND 4 UNDER 35 U.S.C. § 102

Claims 1 and 4 stand rejected under 35 U.S.C. §102(e) as being anticipated the Yanosy patent application (United States Patent Application Publication No. 2003/0217128, published November 20, 2003, hereinafter "Yanosy"). In response, the Applicants have amended independent claim 1 in order to more clearly recite aspects of the present invention. Claim 4 was cancelled without prejudice in a previous amendment.

Particularly, the Applicants respectfully direct the Examiner's attention to the fact that Yanosy fails to teach or suggest the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, where the communication overlay tree comprises one or more nodes representing the application server resources, one or more nodes representing the users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering the nodes representing the application server resources and the nodes representing the plurality of users into groups, such that communications from said groups are routed via a single one of the communication links to the nodes representing middleware, as claimed in Applicants' independent claim 1.

By contrast, Yanosy teaches a single intermediary (i.e., an application quality of service (QoS) negotiator) that provides "a primary interface between any application and the QoS middleware layer" (Yanosy at paragraph 0029). Yanosy clearly does not teach that this intermediary has a hierarchical structure (e.g., such as that of an overlay

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tree). In fact, the word "tree" does not even appear in the disclosure of Yanosy.

The portion of Yanosy that the Examiner cites to support the teaching of forming a communication overlay tree to provide communication links between application server resources and user at best teaches that the QoS middleware layer "provides mediation services between [an] application and [a] network host platform and resource layer, to ... applications and other lower level middleware services ..." (Yanosy, paragraph 0032). This passage provides no disclosure as to the structure of the QoS middleware layer and does not even suggest that such structure is hierarchical or includes a communication overlay tree. As such, Yanosy cannot teach, show, or suggest the use of a communication overlay tree that comprising one or more nodes representing application server resources, one or more nodes representing users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering the nodes representing the application server resources and the nodes representing users into groups, such that communications from the groups are routed via a single one of the communication links to the nodes representing middleware, as recited in the Applicants' independent claim 1.

Notably, the Applicants positively claim a method and system for providing communication support for collaborative applications in which a communication overlay tree provides communication links between application server resources and users, via a middleware level, and the communication overlay tree comprises one or more nodes representing application server resources, one or more nodes representing users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering the nodes representing the application server resources and the nodes representing users into groups, such that communications from the groups are routed via a single one of the communication links to the nodes representing middleware. Specifically, Applicants' independent claim 1 positively recites:

1. A method of providing communication support for collaborative applications comprising:
abstracting a network and application server resources at a

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middleware level;

indexing the application server resources in a network aware and application aware manner to reflect positions of the application server resources in an application space;

indexing a plurality of users to reflect communication interests of the plurality of users in the application space; and

forming a communication overlay tree that provides communication links between the application server resources and the plurality of users, via the middleware level, the communication overlay tree comprising one or more nodes representing the application server resources, one or more nodes representing the plurality of users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering said one or more nodes representing the application server resources and the one or more nodes representing the plurality of users into groups, such that communications from said groups are routed via a single one of the communication links to one of the one or more nodes representing middleware. (Emphasis added)

Applicants' invention is directed toward a method and apparatus for virtualizing network resources. Current state of the art communication management is usually based on implementing an application-specific network layer mechanism. Such network layer mechanisms are often difficult, costly, and time-consuming to implement and maintain. This is despite the fact that there are numerous similarities in the communication primitives of many application-specific network layer mechanisms. Even when application-specific network layer mechanisms are implemented, most do not take into account the actual network conditions that can and do impact communications.

Applicants' invention relieves applications from the task of explicitly handling all communication requirements by providing middleware communication solutions that manage communications for collaborative applications. Such middleware communication solutions use multiple attributes, such as network conditions, application logic, and application server resources, to establish network communications and to handle heterogeneity in service level agreement (SLA) requirements among

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applications and users. The middleware communications solutions use these attributes to construct an overlay tree that communicatively links users to application servers. The overlay tree clusters application servers together and routes communications for particular clusters of application servers through particular middleware servers.

As discussed above, Yanosy fails to teach or suggest the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, as claimed by the Applicants' independent claim 1. Accordingly, the Applicants respectfully submit that independent claim 1 is not anticipated by the teachings of Yanosy. As such, the Applicants respectfully request that the rejection of claim 1 under 35 U.S.C. §102(e) be withdrawn.

II. REJECTION OF CLAIMS 5-23 UNDER 35 U.S.C. § 103

Claims 5-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yanosy in view of the Garcia-Luna-Aceves et al. patent application (United States Patent Application Publication No. 2003/0101278, published May 29, 2003, hereinafter "Garcia-Luna-Aceves"). In response, the Applicants have amended independent claims 12 and 18 in order to more clearly recite aspects of the invention. Claims 5-11 were cancelled without prejudice in a previous amendment.

As discussed above, Yanosy fails to teach or suggest the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, where the communication overlay tree comprises one or more nodes representing the application server resources, one or more nodes representing the users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering the nodes representing the application server resources and the nodes representing the plurality of users into groups, such that communications from said groups are routed via a single one of the communication links to the nodes representing middleware, as claimed in -

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Applicants' independent claims 12 and 18. Garcia-Luna-Aceves fails to bridge this gap in the teachings of Yanosy. At best, Garcia-Luna-Aceves teaches that clients are mapped to servers based on network latency (*i.e.*, a "most favored server" is specified for each client). Garcia-Luna-Aceves clearly does not teach that this network latency map has a hierarchical structure (*e.g.*, such as that of an overlay tree).

Notably, the Applicants positively claim a method and system for providing communication support for collaborative applications in which a communication overlay tree provides communication links between application server resources and users, via a middleware level, and the communication overlay tree comprises one or more nodes representing application server resources, one or more nodes representing users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering the nodes representing the application server resources and the nodes representing users into groups, such that communications from the groups are routed via a single one of the communication links to the nodes representing middlewar. In particular, Applicants' independent claims 12 and 18, as amended, positively recite:

12. A method of virtualizing network resources to support collaborative communications in a network having application servers and users that have communication interests, the method comprising the steps of:

constructing a scalable network map;

indexing the application servers according to positions of the application servers in the network;

indexing the users according to communication interests of the users;

generating a communication overlay tree based on the indexing of the application servers, on the indexing of the users, and on the scalable network map, the communication overlay tree comprising one or more nodes representing the application servers, one or more nodes representing the users, and one or more nodes for clustering said one or more nodes representing the application servers and the one or more nodes representing the users into groups, such that communications between said groups are routed via communication links; and

supporting communications between the application servers and

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the users over the communication overlay tree. (Emphasis added)

18. A method of operating a communication network, comprising the steps of:

identifying a plurality of network resources and network constraints of the plurality of network resources;

identifying a plurality of application servers that are controlled by an application having an application space;

identifying a plurality of users and a communication interest in the application space of each of said plurality of users; and

indexing the plurality of application servers to reflect positions of the plurality of application servers in an attribute space;

indexing said plurality of users according to identified communication interests;

forming a user index identifier for each of said plurality of users; and

establishing a communication overlay tree between the plurality of application servers and the plurality of users based on the network constraints and on the plurality of users as indexed, the communication overlay tree providing communication links between the plurality of application servers and the plurality of users, the communication overlay tree comprising one or more nodes representing the plurality of application servers, one or more nodes representing the plurality of users, and one or more nodes for clustering said one or more nodes representing the plurality of application servers and the one or more nodes representing the plurality of users into groups, such that communications between said groups are routed via the communication links. (Emphasis added)

As discussed above, Yanosy and Garcia-Luna-Aceves fail, singly or in any permissible combination, to teach or suggest the novel invention of providing communication support for collaborative applications by forming a communication overlay tree that provides communication links between application server resources and users, via a middleware level, where the communication overlay tree comprises one or more nodes representing the application server resources, one or more nodes representing the users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering the nodes representing the application server resources and the nodes representing the plurality of users into

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groups, such that communications from said groups are routed via a single one of the communication links to the nodes representing middleware, as claimed by the Applicants' independent claims 12 and 18. Accordingly, the Applicants respectfully submit that independent claims 12 and 18 are not made obvious by the teachings of Yanosy in view of Garcia-Luna-Aceves.

Claims 13-17 and 19-23 depend, directly or indirectly, from claims 12 and 18 and recite additional features. As such, and at least for the reasons stated above, the Applicants respectfully submit that claims 13-17 and 19-23 are also not made obvious by the teachings of Yanosy in view of Garcia-Luna-Aceves. As such, the Applicants respectfully request that the rejection of claims 12-23 under 35 U.S.C. §103(a) be withdrawn.

III. VOLUNTARY AMENDMENTS

The Applicants have voluntarily amended various claims in order to correct minor typographical errors.

IV. CONCLUSION


Thus, the Applicants submit that all of the presented claims fully satisfy the requirements of 35 U.S.C. §102 and 35 U.S.C. §103. Consequently, the Applicants believe that all of the presented claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the maintenance of the final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

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Respectfully submitted,

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Date


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